Sub B2)

WE CLAIM:

1. A spread-spectrum-matched-filter apparatus, for use as part of a spread-spectrum receiver on a received-spread-spectrum signal having a plurality of packets, each of said plurality of packets generated from spread-spectrum processing a header-symbol-sequence signal with a chip-sequence signal and from spread-spectrum processing a data-symbol-sequence signal with the chip-sequence signal, comprising:

code means for generating a replica of the chip-sequence signal;

symbol-matched means, responsive to having a symbol-impulse response set from the replica of the chip-sequence signal, for filtering the received-spread-spectrum signal, and for outputting a despread-header-symbol-sequence signal and a despread data-symbol-sequence signal as a despread-symbol-matched-means output;

frame-matched means having a frame-impulse response matched to the header-symbol-sequence signal for filtering the despread-symbol-matched-means output and for generating a start-data signal in response to the despread-header-symbol-sequence signal matching the frame-impulse response; and

control means, coupled to said symbol-matched means and said code means, responsive to the start-data signal, for setting said frame-matched means for matching said frame-matched means to a sequence of symbols of a packet-symbol sequence signal, and responsive to the start-data signal, for setting said symbol-matched means with a replica of a data-chip-sequence

LAW OFFICES
DAVID NEWMAN
& ASSOCIATES, P.C.
CENTENNIAL SQUARE
P.O. BOX 2728
LA PLATA, MD 20646
(301) 934-6100

signal for matching said symbol-matched means to the data-chip-sequence signal.

2. The spread-spectrum-matched-filter apparatus as set forth in claim 1 wherein said symbol-matched means includes:

in-phase-symbol-matched means, coupled to said code means, responsive to having an in-phase-symbol-impulse response set from a replica of the header-symbol-sequence signal generated by said code means, for despreading from the received-spread-spectrum signal, an in-phase component of a packet as a despread-in-phase component of the header-symbol-sequence signal, and responsive to having the in-phase-symbol-impulse response set from the replica of the chip-sequence signal generated by said code means, for despreading from the received-spread-spectrum signal, an in-phase component of the packet as a despread-in-phase component of the despread-data-symbol-sequence signal; and

quadrature-phase-symbol-matched means, coupled to said code means, responsive to having a quadrature-symbol-impulse response set from the replica of the chip-sequence signal generated by said code means, for despreading from the received-spread-spectrum signal, a quadrature-phase component of the packet as a despread-quadrature-phase component of the header-symbol-sequence signal, and responsive to having the quadrature-symbol-impulse response set from the replica of the data-chip-sequence signal generated by said code means, for despreading from the received-spread-spectrum signal, a quadrature-phase

LAW OFFICES
DAVID NEWMAN
& ASSOCIATES, P. C.
CENTENNIAL SQUARE
P.O. BOX 2728
LA PLATA, MD 20646
(301) 934-6100

component of the packet as a despread-quadrature-phase component of the despread-data-symbol-sequence signal.

3. The spread-spectrum-matched-filter apparatus as set forth in claim 2 wherein said frame-matched means includes:

in-phase-frame-matched means having an in-phase-frame-impulse response matched to an in-phase component of the header-symbol-sequence signal for generating an in-phase-time-reference signal for use for in a signal in response to the in-phase component of the despread-header-symbol-sequence signal matching the in-phase-frame-impulse response; and

quadrature-phase-frame-matched means having a quadrature-phase-frame-impulse response matched to a quadrature-phase component of the header-symbol-sequence signal for generating a quadrature-phase-time-reference signal for use in a signal in response to the quadrature-phase component of the despread-header-symbol-sequence signal matching the quadrature-phase-frame-impulse response.

4. The spread-spectrum-matched-filter apparatus as set forth in claim 1, further including demodulator means, coupled to said symbol-matched means, for demodulating the despread-data-symbol-sequence signal as a received data-symbol-sequence signal.

LAW OFFICES
DAVID NEWMAN
& ASSOCIATES, P.C.
CENTENNIAL SQUARE
P.O. BOX 2728
LA PLATA, MD 20646
(301) 934-6100

5. The spread-spectrum-matched-filter apparatus as set forth in claim 2 or 3 further including demodulator means, coupled to said in-phase-symbol-matched means and to said quadrature-phase-symbol-matched means, for demodulating the despread-in-phase component of the despread-data-symbol-sequence signal and the despread-quadrature-phase component of the despread-data-symbol-sequence signal, as a received-data-symbol-sequence signal.

6. The spread-spectrum-matched-filter apparatus as set forth in claim 1 or 4 wherein:

said symbol-matched means includes a symbol-digital-matched filter having the symbol-impulse response set by the replica of the chip-sequence signal; and

said frame-matched means includes a frame-digital-matched filter having the frame-impulse response matched to the header-symbol-sequence signal.

LAW OFFICES
DAVID NEWMAN
& ASSOCIATES, P. C.
CENTENNIAL SQUARE
P.O. BOX 2728
LA PLATA, MD 20646
(301) 934-6100

7. The spread-spectrum-matched-filter apparatus as set forth in claim 2 wherein:

said in-phase-symbol-matched means includes an in-phase-symbol-programmable-digital-matched filter having the in-phase-symbol-impulse response set by the replica of the chip-sequence signal; and

said quadrature-phase-symbol-matched means includes a quadrature-phase-programmable-digital-matched filter having the quadrature-phase-impulse response set by the replica of the chip-sequence signal.

8. The spread-spectrum-matched-filter apparatus as set forth in claim 3 wherein:

said in-phase-frame-matched means includes an in-phase-frame-digital-matched filter having the in-phase-frame-impulse response matched to the in-phase component of the header-symbol-sequence signal; and

said quadrature-phase-frame-matched means includes a quadrature-phase-frame-digital-matched filter having the quadrature-phase-impulse response matched to the quadrature-phase component of the header-symbol-sequence signal.

LAW OFFICES
DAVID NEWMAN
& ASSOCIATES, P. C.
CENTENNIAL SQUARE
P.O. BOX 2728
LA PLATA, MD 20646
(301) 934-6100

Sub B3
B1

9. A method, using a symbol-matched filter and a frame-matched filter with a spread-spectrum receiver on a received-spread-spectrum signal, the received-spread-spectrum signal having a plurality of packets, with each packet generated from spread-spectrum processing a header-symbol-sequence signal with a chip-sequence signal and from spread-spectrum processing a data-symbol-sequence signal with a data-chip-sequence signal, comprising the steps of:

generating a replica of the chip-sequence signal;

generating, responsive to maximum frame-matched filter output signal, a control signal;

programming said symbol-matched filter, responsive to the control signal and using the replica of the chip-sequence signal, to set said symbol-matched filter a symbol-impulse response matched to the chip-sequence signal;

despreading, with the symbol-matched filter matched to the chip-sequence signal, a header portion of the packet from the received-spread-spectrum signal as a despread-header-symbol-sequence signal;

filtering, with said frame-matched filter having a frame-impulse response matched to the header-symbol-sequence signal, the despread-header-symbol-sequence signal;

generating from the filtered despread-header-symbol-sequence signal, a data-start signal in response to the despread-header-symbol-sequence signal matching the frame-impulse response of the frame-matched filter; and

LAW OFFICES
DAVID NEWMAN
& ASSOCIATES, P.C.
CENTENNIAL SQUARE
P.O. BOX 2728
LA PLATA, MD 20646
(301) 934-6100

Sub. B3

despreading, responsive to timing from the data-start signal, with the symbol-matched filter matched to the chip-sequence signal, a data portion of the packet from the received-spread-spectrum signal as a despread-data-symbol-sequence signal.

10. The method as set forth in claim 9, with the step of despreading the header portion of the packet from the received-spread-spectrum signal further including the steps of:

despreading, from the received-spread-spectrum signal, an in-phase component of the header portion of the packet as a despread-in-phase component of the despread-header-symbol-sequence signal; and

despreading, from the received-spread-spectrum signal, a quadrature-phase component of the header portion of the packet as a despread-quadrature-phase component of the despread-header-symbol-sequence signal.

LAW OFFICES
DAVID NEWMAN
& ASSOCIATES, P. C.
CENTENNIAL SQUARE
P.O. BOX 2728
LA PLATA, MD 20646
(301) 934-6100

11. The method as set forth in claim 9 or 10 with the step of despreading the data portion of the packet further including the steps of:

despreading, from the received-spread-spectrum signal, an in-phase component of the data portion of the packet as a despread-in-phase component of the despread-data-symbol-sequence signal; and

despreading, from the received-spread-spectrum signal, a quadrature-phase component of the data portion of the packet as a despread-quadrature-phase component of the despread-data-symbol-sequence signal.

12. The method as set forth in claim 10 with the step of filtering the despread header-symbol-sequence signal further including the steps of:

generating an in-phase-data-start signal in response to the despread-in-phase component of the despread-header-symbol-sequence signal matching an in-phase-frame-impulse response; and

generating a quadrature-phase-data-start signal in response to the despread-quadrature-phase component of the despread-header-symbol sequence signal matching a quadrature-phase-frame-impulse response.

13. The method as set forth in claim 9, further including the step of demodulating the despread-data-symbol-sequence signal as a received data-symbol-sequence signal.

LAW OFFICES
DAVID NEWMAN
& ASSOCIATES, P. C.
CENTENNIAL SQUARE
P.O. BOX 2728
LA PLATA, MD 20646
(301) 934-6100

14. The method as set forth in claim 10 further including the step of demodulating an in-phase component of the despread-data-symbol-sequence signal and a quadrature-phase component of the despread-data-symbol-sequence signal, as a received-data-symbol-sequence signal.

LAW OFFICES
DAVID NEWMAN
& ASSOCIATES, P. C.
CENTENNIAL SQUARE
P.O. BOX 2728
LA PLATA, MD 20646
(301) 934-6100

15. A spread-spectrum-matched-filter apparatus, for use with a spread-spectrum receiver on a received-spread-spectrum signal having a plurality of packets, with each packet generated from spread-spectrum processing a header-symbol-sequence signal with a chip-sequence signal and from spread-spectrum processing a data-symbol-sequence signal with the chip-sequence signal, comprising:

a code generator for generating a replica of the chip-sequence signal;

a symbol-matched filter responsive to having a symbol-impulse response set from the replica of the chip-sequence signal, for filtering from the received-spread-spectrum signal, a header portion of the packet, to output a despread-header-symbol-sequence signal and, for filtering from the received-spread-spectrum signal, a data portion of the packet to output a despread-data-symbol-sequence signal;

a frame-matched filter having a frame-impulse response matched to the header-symbol-sequence signal for filtering the despread-header-symbol-sequence signal and for generating a peak-header-correlation signal in response to the despread-header-symbol-sequence signal matching the frame-impulse response; and

a controller, coupled to said symbol-matched filter and said code generator, responsive to the peak-header-correlation signal, for sampling the output of said symbol-matched filter and for detecting a data-chip-sequence signal.

LAW OFFICES
DAVID NEWMAN
& ASSOCIATES, P.C.
CENTENNIAL SQUARE
P.O. BOX 2728
LA PLATA, MD 20646
(301) 934-6100

16. The spread-spectrum-matched-filter apparatus as set forth in claim 15 with said symbol-matched filter further including:

an in-phase-symbol-digital-matched filter, coupled to said code generator, responsive to the replica of the chip-sequence signal generated by said code generator for despreading from the received-spread-spectrum signal, an in-phase component of the header portion of the packet as a despread in-phase component of the despread-header-symbol-sequence signal, and for despreading from the received-spread-spectrum signal, an in-phase component of the data portion of the packet as a despread-in-phase component of the despread-data-symbol-sequence signal; and

a quadrature-phase-symbol-digital-matched filter, coupled to said code generator, responsive to the replica of the chip-sequence signal generated by said code generator for despreading from the received-spread-spectrum signal, a quadrature-phase component of the header portion of the packet as a despread quadrature-phase component of the despread-header-symbol-sequence signal, and for despreading from the received-spread-spectrum signal, a quadrature-phase component of the data-portion of the packet as a despread-quadrature-phase component of the despread-data-symbol-sequence signal.

LAW OFFICES
DAVID NEWMAN
& ASSOCIATES, P. C.
CENTENNIAL SQUARE
P.O. BOX 2728
LA PLATA, MD 20646
(301) 934-6100

17. The spread-spectrum-matched-filter apparatus as set forth in claim 16 wherein said frame-matched filter includes:

an in-phase-frame-digital-matched filter having an in-phase impulse response matched to an in-phase component of the header-symbol-sequence signal for generating an in-phase-data-start signal in response to the in-phase component of the despread-header-symbol sequence signal matching the in-phase impulse response; and

a quadrature-phase-frame-digital-matched filter having a quadrature-phase impulse response matched to a quadrature-phase component of the header-symbol-sequence signal for generating a quadrature-phase-data-start signal in response to the quadrature-phase component of the despread-header-symbol sequence signal matching the quadrature-phase impulse response.

18. The spread-spectrum-matched-filter apparatus as set forth in claim 15, 16 or 17, further including a demodulator, coupled to said symbol-matched filter, for demodulating the despread-data-symbol-sequence signal as a received data-symbol-sequence signal.

LAW OFFICES
DAVID NEWMAN
& ASSOCIATES, P. C.
CENTENNIAL SQUARE
P.O. BOX 2728
LA PLATA, MD 20646
(301) 934-6100

19. The spread-spectrum-matched-filter apparatus as set forth in claim 16 or 17 further including a demodulator, coupled to said in-phase-symbol-digital-matched filter and to said quadrature-phase-symbol-digital-matched filter, for demodulating the despread-in-phase component of the despread-data-symbol-sequence signal and the despread-quadrature-phase component of the despread-data-symbol-sequence signal as a received-data-symbol-sequence signal.

add B3

add C1

add D1

add E2

LAW OFFICES
DAVID NEWMAN
& ASSOCIATES, P. C.
CENTENNIAL SQUARE
P.O. BOX 2728
LA PLATA, MD 20646
(301) 934-6100